IAC Mission Success Stories

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Nondestructive Testing IAC (NTIAC)

NTIAC Story 1 Story 2

Nondestructive Evaluation Communication Group

The broadly diversified field of nondestructive testing/inspection/evaluation (NDE) continues to grow in importance and potential synergy within the Federal government. Techniques and instruments that just a few years ago were confined to research laboratories are beginning to attain field application. Advances in diagnostics and computational techniques are bringing life prediction and system prognostics based on nondestructive, continuous monitoring closer to realization. As a consequence, sharing information about NDE programs and plans, and discussion about common areas of interest can significantly improve utilization of NDE and avoid duplication of effort within the DoD and other government agencies.

Continued on Story 1

Computational Nondestructive Evaluation and Probability of Detection

Reduced procurement budgets are requiring the operational life of many military systems to be extended. In addition to the Department of Defense, other Federal government organizations, such as NASA and the FAA, are all facing similar problems on new or aging systems. This is placing great importance on the ability to find, characterize, and address the deleterious effects of operation in a wide variety of environments. Successful life management of these aging systems substantially depends on the ability of nondestructive evaluation (NDE) to identify and quantitatively characterize defects and changes in materials and structures throughout their lifetime.

A frequently used measure of the reliability of a nondestructive evaluation method is the Probability of Detection (POD) which gives the probability of detecting cracks of various lengths and depths (or thinning of parts due to corrosion) under various inspection conditions. However, it is an arduous and expensive task to experimentally determine POD curves for the wide variety of available NDE methods. Each method must be individually investigated for each specific material or application, and for a variety of flaw types and sizes. The expense is rapidly increasing do to the introduction of new or improved NDE methods and new and improved materials.

Continued on Story 2

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Nondestructive Evaluation Communication Group (continued)

To promote intra-governmental information sharing, NTIAC recently helped organize the annual two-day meeting of the Nondestructive Evaluation Communication Group. The Group is a reflection of the enhanced importance of NDE to a substantial number of Federal agencies and organizations. This multi-agency Communication Group is chartered under the auspices of the Materials Technology Subcommittee of the Committee on Technology, which is administered, by the White House Science Advisor's Office, and reports ultimately to the National Science and Technology Council. The NDE Communication Group is chaired by Dr. Lewis Sloter, Associate Director for Materials and Structures in the Office of the Deputy Under Secretary of Defense for Science and Technology. The NDE Communication Group provides an especially effective forum for sharing information about NDE programs and plans and fostering intra-governmental coordination and information transfer in NDE.

Inspection of Aging Assests is Important to All Government Agencies.

In addition to representatives from the Army, Navy, and Air Force, the recent meeting brought together representatives from the:

- Department of Commerce (National Institute for Standards and Technology)
- Department of Energy
- Department of Transportation (Federal Highway Administration, Federal Aviation Administration, Research and Special Programs Administration)
- National Science Foundation
- Nuclear Regulatory Commission
- National Aeronautics and Space Administration

Management/technical briefings were provided on NDE programs underway and contemplated in the respective agencies. Several briefings addressing the special topic of aging assets were incorporated into the program. In addition, NTIAC staff briefed the Group on NTIAC technical resources, activities and capabilities.

The limited distribution NDE Communication Group Summary Report, edited by NTIAC, documents the current status of a government-wide NDE research and development program and provides guidance for enhancing interagency coordination in the area of NDE.

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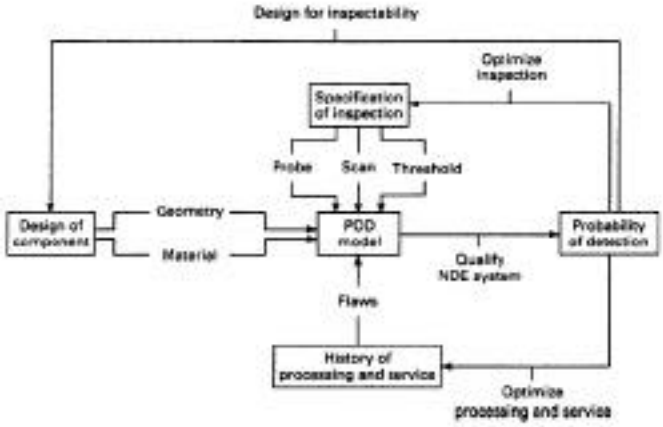
Computational Nondestructive Evaluation and Probability of Detection (continued)

It has been shown to a limited degree that NDE measurements can be modeled or simulated in a computer to determine PODs and to optimize NDE methodologies. In addition, in recent years there has been a steady increase in the ability of physical models to accurately predict the results of inspections of real parts. As a result, the opportunity now exists to incorporate such models into new computer simulation procedures for POD determinations that reduce time-cost constraints.

In a Technical Area Task performed for the NDE Sciences Branch in the Materials and Manufacturing Directorate at the Air Force Research Laboratory, NTIAC has developed a Computational NDE and POD Modeling Plan. This Plan provides the framework for development of a comprehensive modeling science and technology to determine the reliability of POD of NDE measurements, and when fully implemented will result in substantial savings in cost and time.



Schematic Diagram of Potential Computational NDE Model.

The Plan entails formation of a multi-agency consortium administered and coordinated by NTIAC with technical leadership provided by a board of directors composed of consortium members. Technical staff from a variety of research organizations would participate in distributed modeling activities and NTIAC would disseminate the results of the consortium's efforts. NTIAC would serve as a repository to distribute and maintain the software and would also be the consortium's focal point for training in the use of POD modeling tools with consortium participants and others serving as instructors.

The consortium approach that is called for in the NTIAC developed plan will provide a distributed management and cost shared approach among DoD organizations and other Federal agencies for developing this very much needed emerging technology. In developing this Plan, NTIAC has interacted with a number of DoD and other federal agencies to gather their input and potential financial support for the Plan. A successful NTIAC centered POD consortium activity will result in cost savings and wider uses of much needed POD data for evaluating aging systems.

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